

NORTH DAKOTA

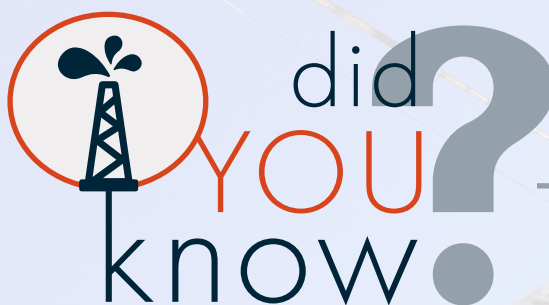
FRACKING & WATER USE

FACTS



With the growth of the oil boom in recent years, and the development of water dependent technologies that allow the capture of oil that was previously inaccessible, the public has expressed interest about how oil development may be affecting the availability of North Dakota's water resources.

This publication provides an overview of these issues and what they mean for North Dakota.



SINCE 2014

the average fracking process in North Dakota has increased water use from about 11 acre-feet of water to about 25 acre-feet.

IN 2018

records indicated that 38,961 acre-feet of surface and ground water were used for fracking purposes. That amounts to 10.1% of North Dakota's consumptive water use.

ONE DAY

of the average daily flow of the Missouri River at Bismarck (45,480 acre-feet) is enough water to frack 1,819 wells.

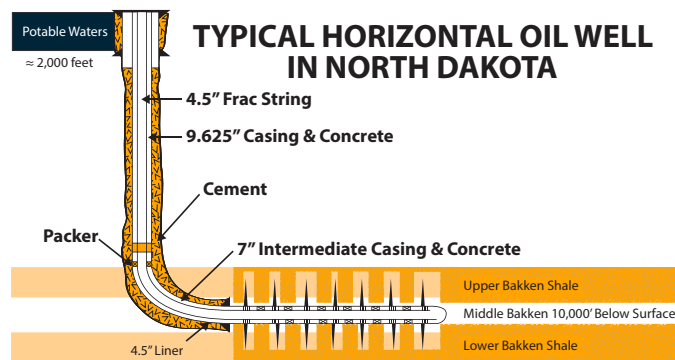
EVAPORATION

from Lake Sakakawea is, on average, 2,472 acre-feet per day, or enough to frack over 98 wells.

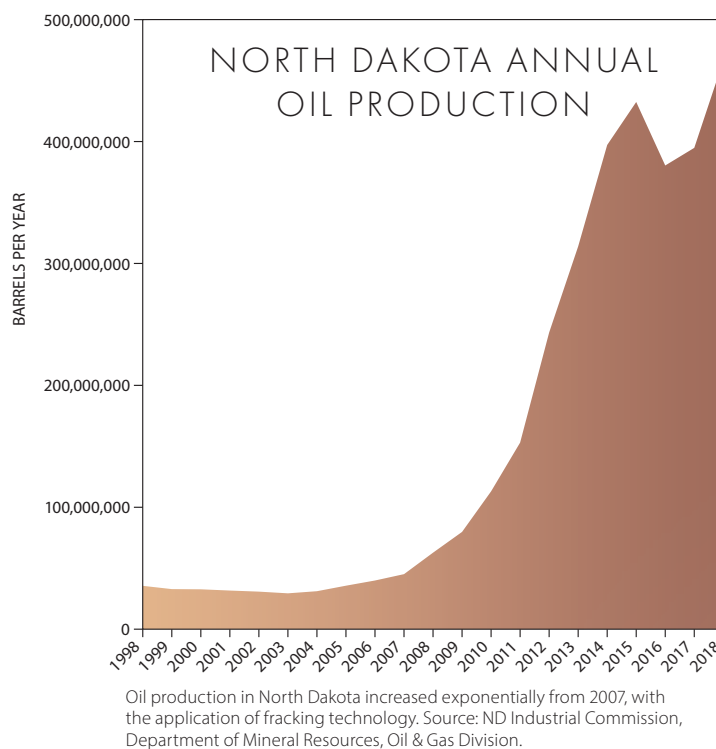
ABOUT HYDRAULIC FRACTURING

Hydraulic fracturing for oil or gas, commonly called “fracking”, is a process where water and other materials are injected into oil-bearing formations of rock under high pressure, fracturing the rock, and releasing the oil. Oil wells of this type in North Dakota generally require approximately 25 acre-feet of fresh water for the drilling and hydraulic fracturing process, necessitating access to reliable water supplies. The effectiveness of fracking has allowed North Dakota to become the second largest oil-producing state in the United States.

North Dakota has proven to have substantial deposits of oil-bearing rock suitable for fracking; currently in two rock formations - the Bakken and the Three Forks. Because the drilling process requires a fair amount of water to fracture the oil-bearing rock, both surface water and ground water sources have been used. Where ground water has been used, it has generally come from freshwater aquifers within two thousand feet of the surface, and that water is managed by the Appropriations Division of the Office of the State Engineer. Some water for fracking comes from saline aquifers located between five and six thousand feet below the surface. The water in these saline aquifers has picked up a great deal of salts and other minerals from the surrounding rock, making the water in these aquifers in



Even though hydraulic fracturing processes in North Dakota happen thousands of feet below potable water sources, many safety measures are implemented to protect ground water from contamination.



western North Dakota unsuitable for human consumption, but useful for some types of fracking. Surface water is the preferred source, because the region where the oil extraction is occurring contains the Missouri River, through which approximately 96 percent of the water in North Dakota's rivers and streams flows annually.

The Missouri River system is an extremely valuable source of water, both in terms of quality and quantity, although ground water is used where it is difficult to get access to Missouri River water.

In other parts of the United States, fracking has been focused on shallow natural gas and oil bearing rock formations. Because these formations are so shallow, there has been concern about impacts from fracking to



1951

Oil Discovered In North Dakota In Williams County Near Tioga.



1984

North Dakota's First Major Oil "Boom" Peaks At 52 Million Barrels That Year.



1987

North Dakota's First Horizontal Well Drilled.



2004

North Dakota's First Middle Bakken Horizontal Well Drilled.



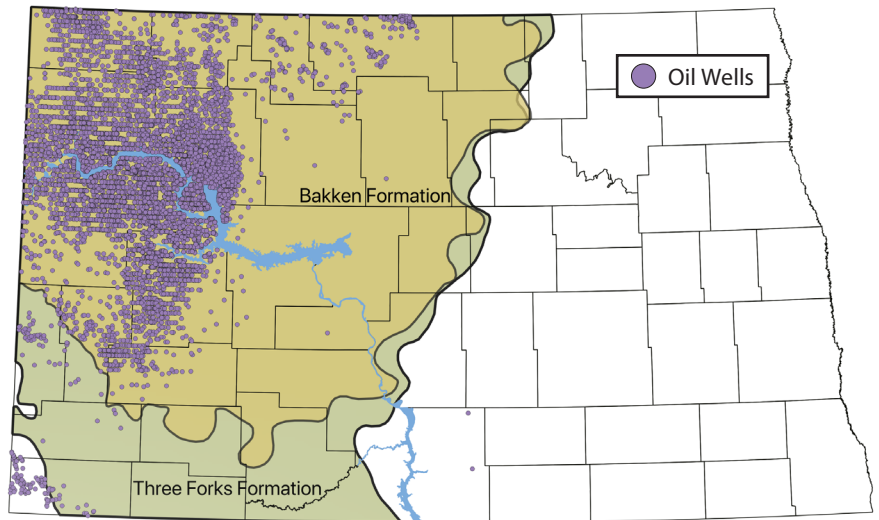
2006

North Dakota Is The Nation's Ninth Largest Oil Producing State.

ABOUT HYDRAULIC FRACTURING

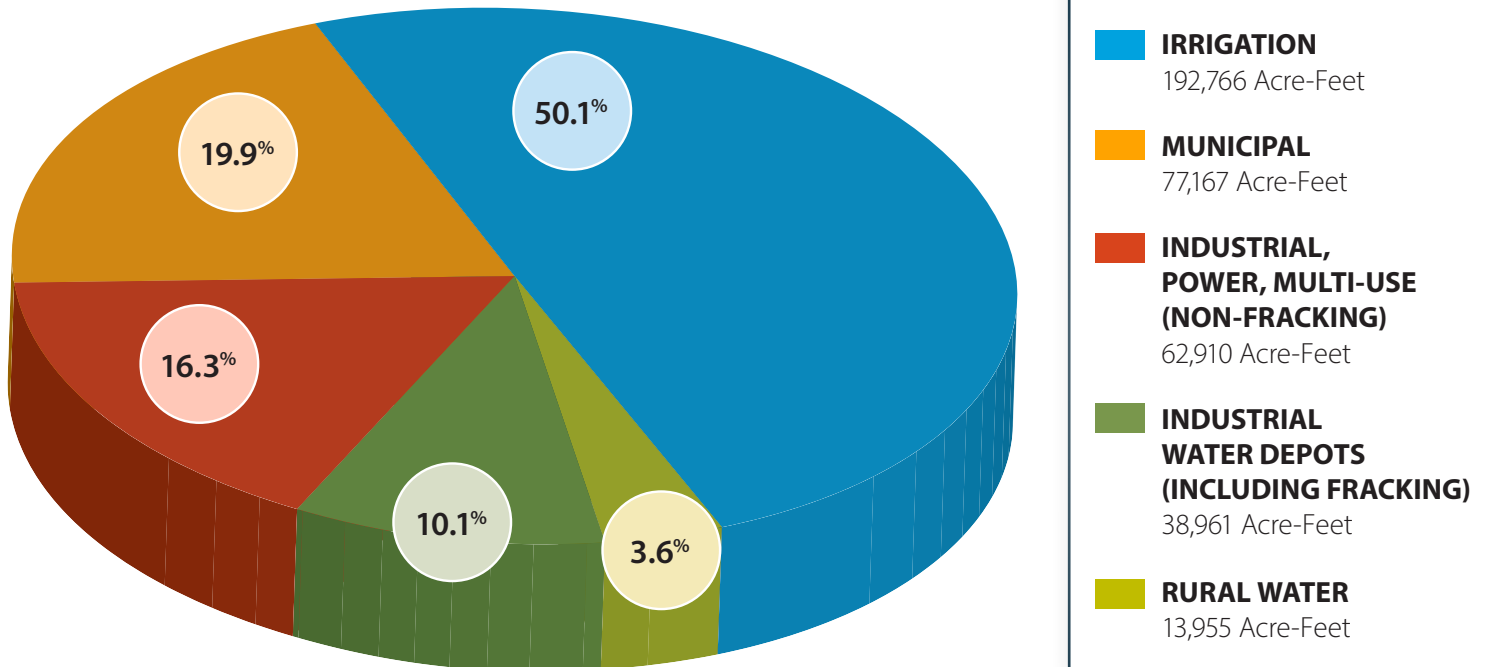
the shallow aquifers in those areas, which are often also used for drinking water. In North Dakota, the oil-bearing formations are much deeper, generally over 10,000 feet (nearly two miles) beneath the surface. This means oil wells are thousands of feet below potable ground water aquifers.

In between the potable aquifers and oil bearing rock formations, are approximately 8,000 feet (1.5 miles) of rock, separating the oil extraction process from drinking water supplies.



The location of the 15,355 oil wells in North Dakota drilled between 2007 and 2018.
Not all drilled wells end up producing oil.

2018 CONSUMPTIVE WATER USE IN ND



2007

Bakken Oil Production Begins To Increase Dramatically.



2012

North Dakota Becomes The Nation's Second Largest Oil Producing State (242 Million Barrels in 2012)-Behind Only Texas.



2018

North Dakota Oil Production Reaches A New All-Time High In December At Just Over 1.4 Million Barrels Per Day.



2019

In January, The Number Of Producing Wells Reaches An All-Time High At 15,409.

ND OIL PRODUCTION TIMELINE

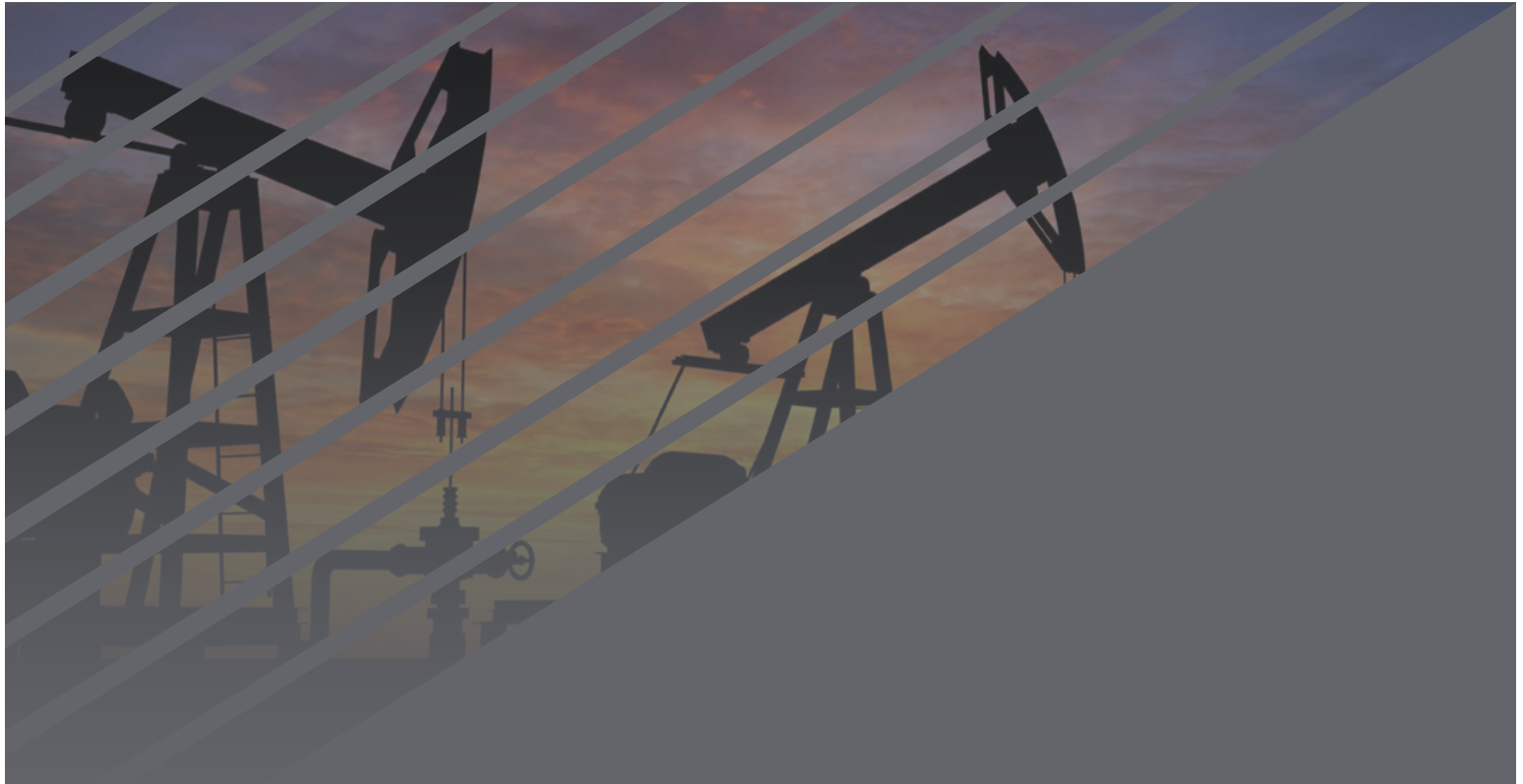
WATER MANAGEMENT & PERMITTING

North Dakota's Office of the State Engineer is responsible for managing the State's water resources, and has assembled an extensive and detailed water resources data program. The depth, breadth, and quality of that data collection is unprecedented in its scope today. Perhaps most importantly, the methodology used to collect and analyze this data is uniform, consistent, and scientifically defensible. Because of this extensive and regularly updated collection of data, the Office of the State Engineer is able to track impacts to the water resources of the state.

In addition to the tracking of ground and surface water resources, permitted water users are required to provide annual reports of their actual water use. Permitted water users are annually allocated a specific volume of water

from a specific source, such as an aquifer or surface water source. Users are allowed to use up to the permitted amount, but no more. Metering and periodic monitoring are conducted for all industrial water uses. In the case of water use for fracking, a process has been developed to provide even more frequent measurements of actual use, through on-site remote telemetry.

When water use exceeds what has been permitted, the Office of the State Engineer has the authority to assess fines and penalties in order to discourage such actions in the future. Fines can be quite substantial, ranging from a few hundred dollars, to fines approaching \$1 million. Further, if a user exceeds their allocated amount in a given year, the amount of overage is subtracted from their available amount the following year.



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